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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/758,027

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EXAMINER

FLORES, LEON

ART UNIT

PAPER NUMBER

2611

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/758,027	Applicant(s) KIM ET AL.	
	Examiner Leon Flores	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-15 is/are allowed.
- 6) ☒ Claim(s) 1-11, 16 and 17 is/are rejected.
- 7) ☒ Claim(s) 1-7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1/18/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

1. Claims 1-7 are objected to because of the following informalities:
2. In claim 1, the limitation “**if the error**” is indefinite, and it should be replaced with “**when the error**”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims (1, 3-11, 16-17) are rejected under 35 U.S.C. 102(b) as being anticipated by Sudo et al (hereinafter Sudo) (JP 2000091965A).**

Re claim 1, Sudo discloses a method of updating a tap coefficient of a channel equalizer, comprising: determining whether or not an error of the channel equalizer converges within a range of a threshold of visibility (See abstract); and updating the tap coefficient of the channel equalizer using a least mean square (LMS) algorithm if the

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error converges within the range of the threshold of visibility or if the error does not converge within the range of the threshold of visibility and a control signal is in a first state (See fig. 1: 120 & 112, and paragraph 70. Furthermore, control signal C1 acts as an enable/disable to switch 112.); or updating the tap coefficient of the channel equalizer using a Kalman algorithm if the error does not converge within the range of the threshold of visibility and the control signal is in a second state. (See fig. 1: 119 & 112, and paragraph 70. Furthermore, control signal C1 acts as an enable/disable to switch 112.)

Re claim 3, Sudo further discloses a method of updating a tap coefficient of a channel equalizer according to claim 1, wherein: the second state of the control signal is a training signal. (See fig. 1: 112 & paragraph 58)

Re claim 4, Sudo further discloses a method of updating a tap coefficient of a channel equalizer according to claim 3, wherein: the error is a difference between the training signal and a signal output from the channel equalizer. (See fig. 1: the output of element 113 & paragraph 59)

Re claim 5. Sudo further discloses a method of updating a tap coefficient of a channel equalizer according to claim 1, wherein: the error is a difference between a channel equalizer output signal and a determination circuit output signal, wherein the determination circuit output signal has a certain value corresponding to the channel

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equalizer output signal. (See fig. 1: 113 & 109, and paragraphs 55-56 & 59.

Furthermore, the error is the difference of the output of the digital adder 108 and the output of the judgement machine 109.)

Re claim 6, Sudo further discloses a method of updating a tap coefficient of a channel equalizer according to claim 1, wherein: when the tap coefficient of the channel equalizer is updated using the LMS algorithm, the tap coefficient is updated with the following equation: $c(n)=c(n-1)+\mu \cdot e(n)y(n)$ and further wherein $c(n)$ denotes an updated tap coefficient vector of the channel equalizer, $c(n-1)$ denotes a tap coefficient vector of the channel equalizer that will be updated to obtain $c(n)$, μ denotes a step size, $e(n)$ denotes an error of the channel equalizer and $y(n)$ denotes data input to the channel equalizer. (See paragraph 52, formula 2)

Re claim 7, Sudo further discloses a method of updating a tap coefficient of a channel equalizer according to claim 1, wherein: when the tap coefficient of the channel equalizer is updated using the Kalman algorithm, the coefficient is updated with the following equation: $c(n)=c(n-1)+K(n)e(n)$ and further wherein $c(n)$ denotes an updated tap coefficient vector of the channel equalizer, $c(n-1)$ denotes a tap coefficient vector of the channel equalizer updated to obtain $c(n)$, $K(n)$ denotes a Kalman gain vector and $e(n)$ denotes an error of the channel equalizer. (See paragraph 52, formula 1)

Claim 8 is a system claim corresponding to method claim 1. Hence, the steps performed by method claim 1 would have necessitated the elements in system claim 8. Therefore, claim 8 has been analyzed and rejected w/r to claim 1.

Claim 9 is a system claim corresponding to method claim 3. Hence, the steps performed by method claim 3 would have necessitated the elements in system claim 9. Therefore, claim 9 has been analyzed and rejected w/r to claim 3.

Claim 10 is a system claim corresponding to method claim 6. Hence, the steps performed by method claim 6 would have necessitated the elements in system claim 10. Therefore, claim 10 has been analyzed and rejected w/r to claim 6.

Claim 11 is a system claim corresponding to method claim 7. Hence, the steps performed by method claim 7 would have necessitated the elements in system claim 11. Therefore, claim 11 has been analyzed and rejected w/r to claim 7.

Re claim 16, Sudo further discloses a circuit for updating a tap coefficient of a channel equalizer comprising: a channel equalizer arranged and configured to produce a channel equalizer output signal (See fig. 1 & abstract); means for generating a determination signal corresponding a value of the channel equalizer output signal (See fig. 1: 109 & paragraph 56. Furthermore, one skilled in the art would know that element 109 is also called a slicer); means for receiving a control signal, the determination signal

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and a training signal and selectively outputting the determination signal or the training signal (See fig. 1: 112 & paragraphs 58 & 68); means for generating an error signal (See fig. 1: 113 & paragraph 58 & 68); means for comparing the error signal to a threshold of visibility and generating a comparator output signal; and means for selectively updating the tap coefficient using a LMS algorithm or a Kalman algorithm based on a control signal state and a comparator output signal state. (See fig. 1: 120 & 112, and paragraph 70. Furthermore, control signal C1 acts as an enable/disable to switch 112. And, see fig. 1: 119 & 112, and paragraph 70. Furthermore, control signal C1 acts as an enable/disable to switch 112.)

Claim 17 is a system claim corresponding to method claim 1. Hence, the steps performed by method claim 1 would have necessitated the elements in system claim 8. Therefore, claim 8 has been analyzed and rejected w/r to claim 1.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. **Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo et al (hereinafter Sudo) (JP 2000091965A) in view of Ueda (US Patent 5,541,956).**

6. Re claim 2, Sudo discloses a method of updating a tap coefficient of a channel equalizer according to claim 1, but the reference of Sudo fails to specifically disclose that wherein: determining whether or not an error of the channel equalizer converges within a range of a threshold of visibility includes determining whether a square of the error of the channel equalizer is smaller or larger than the threshold of visibility.

7. However, Ueda does. (See fig. 4A & col. 24, lines 26-33) Ueda discloses a comparator for comparing the mean value of the equalized square errors with the output of a threshold value, and outputting a signal for selecting the linear adaptive equalizer when the mean value is smaller than the threshold value and outputting a selection hold signal when the mean value is not smaller than the threshold value.

Therefore, taking the combined teachings of Sudo and Ueda as a whole. It would have been obvious to one of ordinary skill in the art to have incorporated this feature into the system of Sudo, in the manner as claimed and as taught by Ueda, for the benefit of selecting the linear adaptive equalizer. (See col. 24, lines 26-33)

Allowable Subject Matter

8. Claims 12-15 are allowed.
9. The following is a statement of reasons for the indication of allowable subject matter: The art of record does not suggest the respective claim combinations together and nor would the respective claim combinations be obvious with:

Re claim 12, the further limitation, *"a circuit for updating a tap coefficient of a channel equalizer comprising: a channel equalizer arranged and configured to produce a channel equalizer output signal; a slicer arranged and configured to determine a certain value corresponding to the channel equalizer output signal and generate a slicer output signal corresponding to the certain value; a selection circuit arranged and configured to receive a control signal, the slicer output signal and a training signal, and, in response to the control signal, output the slicer output signal or the training signal as a selection circuit output signal; a subtracter arranged and configured to subtract the channel equalizer output signal from the selection circuit output signal and generate an error output signal; a convergence examining and comparing (CEC) unit arranged and configured to compare a range of the threshold of visibility with the error output signal and generate a first CEC output signal when the error output signal converges within the range of threshold of visibility or a second CEC output signal when the error output signal does not converge within the range of the threshold of visibility; a decoder arranged and configured to receive the control signal and the output signal of the CEC unit and produce a decoder output signal; and an updating circuit arranged and configured to update the tap coefficient of the channel equalizer in response to the*

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decoder output signal, wherein the updating circuit updates the tap coefficient of the channel equalizer using a LMS algorithm when the decoder output signal is in a first state and using a Kalman algorithm when the decoder output signal is in a second state". Claims 13-15 depend on claim 12.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Flores whose telephone number is 571-270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LF
March 15, 2007


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SUPERVISORY PATENT EXAMINER